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ABSTRACT

A study determined the use of different information sources for decision making used by traditional Arab farmers in Israel. A questionnaire was used to interview 48 farmers from 4 villages in the Nazareth region and 56 farmers from 5 villages in the Gaza strip in their homes. Farmers were asked to name major innovations they had adopted during the last 5 years and then to reconstruct their decision-making process, emphasizing sources of information and influence. Sixty-five percent of farmers in the Nazareth region and 58 percent in the Gaza strip reported that they had adopted at least one major innovation, such as mechanization, drip irrigation, new crops, or plastic covering, in the past 5 years. Extension advisers and other farmers were about equal in their importance as the first source of information about the innovation. In the Gaza strip, still the more traditional of the two regions, the extended family was one of the major sources of initial information. In making the final decision to adopt an innovation, advisers had a very strong influence and the family was less influencial in the Nazareth Region. In the Gaza Strip, where advisers have statutory powers and more contact with farmers, their influence was still strong but the influence of family was more dominant. Farmers were happy with their adoption decisions; 98 percent in the Nazareth region and 86 percent in the Gaza strip said that they would make the same decision again. (Five data tables, 1 figure, and 18 references are included.) (CML)

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USE OF DIFFERENT INFORMATION SOURCES FOR DECISION MAKING BY TRADITIONAL FARMERS IN A PROGRESSIVE KNOWLEDGE SYSTEM

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USE OF DIFFERENT INFORMATION SOURCES FOR DECISION MAKING BY TRADITIONAL FARMERS IN A PROGRESSIVE KNOWLEDGE SYSTEM[1]

Abstract

The types of innovations which traditional Arab farmers in the Nazareth region of Israel and in the Gaza strip adopted were influenced by the length of time during which each region was exposed to an intensive agricultural knowledge system and to changing socio-economic conditions.

Empirical evidence substantiates the argument, that at Roger's persuasion stage in the adoption process, a "worth" type of knowledge should be added to his "how-to" type of knowledge, and that farmers tend to go to different sources to obtain advice on these two central issues.

Extension had a strong influence on farmers' decision making process, especially by giving "how-to" advice. The large majority of farmers who had contact with advisers stated also that these had the strongest influence on their adoption of innovation. Once farmers had received their first information from advisers (which was usually not the case), they were also influenced by them to adopt the innovation. The family seems to have more influence on the decision to adopt an innovation, where socio-economic family bonds are stronger.

Farmers in both regions showed a rational decision making behavior, balancing between a wish to innovate and careful weighing of the economic worth of the innovation. Once farmers had made a decision, only very few regretted their choice.

1. INTRODUCTION

Types of Knowledge

Rogers (1983) differentiates between three types of knowledge about an innovation: "awareness-knowledge" (What is the innovation?) which motivates an

individual to seek (practical) "how to" knowledge and (theoretical) "principles knowledge". Rogers cites as an example for the latter "the biology of plant growth which underlies fertilizer innovations".

There is no doubt that awareness begins with receiving the first, even unclear information about an innovation. Also, "how-to" information is of pivotal importance to the later success of an adopted innovation. However, one can argue about the importance and even the existence of the "principle knowledge" stage in many cases. Rogers agrees that "it is usually possible to adopt an innovation without principles knowledge". All of us actually use technologies, from television to computers, often without having much "principles knowledge". Rogers is right in pointing out that the lack of "principles knowledge" can lead to failures and consequently to discontinuance, but nevertheless, at the decision making stage, "principles knowledge" plays a minor role.

On the other hand, in Roger's typology of knowledge a most important one is missing: "worth-knowledge", i.e. looking for an answer to the question: "Is it worthwhile to adopt the innovation about which I became aware?" Usually, "worth knowledge" has mainly (but not exclusively) an economic character. As Griliches (1957) and Hooks et al. (1983) have pointed out, economic constraints are the best predictors for the adoption of different agricultural technologies.

Usually "worth-knowledge" is sought before the "how-to knowledge." If the innovation does not seem to be worthwhile, why bother to seek "how-to" information? However, the more technically complex an innovation is, the more "how-to" knowledge is needed to decide if it is worthwhile to adopt the innovation.

In this paper, I want to describe what sources of information were used by farmers in a given area to obtain "worth-knowledge" and "how-to knowledge", thus demonstrating that they prefer different sources of information for different types of knowledge in the persuasion stage.

Information Sources in Traditional and Progressive Societies

The theory of diffusion of innovation claims universality, and indeed, similar stages in the diffusion and adoption of knowledge have been identified in different social systems and continents. Classical diffusion research assumed that over time agricultural knowledge "trickled down" to most farmers and the difference was mainly one between early and late adopters (hence the concept of diffusion, borrowed from the physical sciences where it is a uniform process). In his latest edition, Rogers (1983) discusses the fact that during the 1960's generalizations on the diffusion of innovations were thought to be cross-culturally valid. However, already at that time, differences between economically developed and less developed countries were identified. Thus Rahim (1965) and Rogers and Shoemaker (1971) found that at the knowledge stage cosmopolite, interpersonal channels were especially important in developing countries, while in developed countries mass media played the major role.

Such differences in the use of mass media and other information sources seem to exist also between sub-populations within a given country. Thus, a survey which examined sources of information used by over 1600 larger farmers in Great Britain showed that they used written mass media quite intensively (ADAS, 1980); but Scoullar (1978) who studied the decision making behavior of Cheshire dairy farmers did not find corresponding data. Rather than reaching conclusions based on wide samples which blur differences between socio-economically and socio-culturally different sub-populations, we should look at the unique features of each of these sub-populations.

Two interesting cases of sub-populations which differ from their surrounding socio-culturally, but belong to its economical and knowledge systems, are Arab farmers in the Nazareth region of Israel and in the Gaza strip. They live in traditional, mainly Moslem village communities. They differ from their Jewish neighbours (Moshav smallholder cooperatives and Kibbutzim) in their much more conservative socio-cultural patterns.

This paper reports research findings on their use of various sources of information at different stages in the decision making process, and relates them to socio-economic factors.

The Agricultural Knowledge System in the Nazareth and Gaza Regions

Until 1948, both regions were parts of British ruled Palestine. Agriculture in both regions remained without many changes, although the Nazareth region received more attention by the authorities. In 1948 Nazareth became part of the State of Israel, and the Gaza strip came under Egyptian rule. The major breakthrough came to the Nazareth region after the establishment of a regional extension bureau in Nazareth, soon after a national Extension Service was set up in the Israeli Ministry of Agriculture, in 1960.

Arnon et al. (1971, 1976) have described the rapid agricultural development in the Arab sector of Israeli agriculture and the central role which extension played in this development. Natour (1982) assessed the considerable economic contribution of the agricultural extension system in the Nazareth region, and Tsur (1985) studied the impact of the irrigation cooperatives, which were set up in the Arab agricultural sector with help of the extension service. These cooperatives are the exception in a rural system, in which family links are strong and formal cooperatives, involving different extended families are seldom.

The agricultural development in the Gaza strip was slower, and its exposure to intensive agricultural extension came later. Between 1948 and 1967, the main emphasis was put on the rapid development of citrus groves. Agricultural officers were more concerned with supervising packing and marketing and with other statutory tasks than with extension. The priority of roles changed in favour of a more intensive extension effort, after the Israeli occupation of the Gaza strip in 1967 (Blum, 1987).

In both regions, local extension advisers have quite a good professional background, many of them (and especially the younger ones) hold a Bachelor's degree in Agriculture. Both groups of extension workers have ready access to central and regional research institutes and to the pool of subject matter specialists in the Israeli extension service. Both have frequent contact with a high percentage of farmers (Blum, 1988). However, the advisers in the Gaza strip continue to fulfill also statutory functions, while their peers in the Nazareth region devote all their time and efforts to extension only.

2. METHODOLOGY

Development of the Questionnaire

An interview questionnaire was developed. Farmers were asked to name one or two major innovation they had adopted during the last five years and which involved a change in the structure of the farm, in the labor needed etc. Then they were encouraged to reconstruct their decision making process, emphasizing the sources of information and influence at four stages in the adoption process. We asked them in respect to each innovation:

(1) How did they get their first knowledge about the innovation?
(2) What further source of knowledge did they use before deciding if the innovation should be adopted?
(3) What further source of knowledge did they use before deciding how it should be adopted?
(4) Who had the strongest influence on the final decision making?

We also inquired if they would again make the same decision, given the opportunity. Farmers were also asked to reconstruct the decision making process in a case, in which they had rejected the suggestion to adopt a certain innovation.

The following independent variables served to explain the results which were obtained: age, education (number of school years), agricultural education, size of the farm operations, the time a farmer devotes to the work on his farm, his innovativeness and involvement in field trials (as assessed by himself) and his membership in agricultural committees. The last factor was used as indicator of leadership.

In the Gaza strip practically all farms were irrigated, but not so in the Nazareth region. In order to allow for meaningful comparisons on the basis of land being cultivated, the actual rainfed area under the control of a farmer in the Nazareth area was multiplied with the ratio of income from a unit of rainfed land to the income from irrigated land and added to the irrigated area which he cultivates. The ratio was 1:5 for most villages.

The questionnaire was content validated by a professional panel and then field tested by interviewing farmers in 3 villages in the target region. At this stage, field investigators were trained in conducting the structured interviews. Based on the preliminary run, small changes were made in the phrasing of the questionnaire.

The Sample and Administration of the Questionnaire

The interviews took place in the farmers' homes. 48 farmers from 4 villages in the Nazareth region and 56 farmers from 5 villages in the Gaza strip were interviewed.

Using the SAS statistical package, crosstabulations with covariates and correlations were computed and tested on their statistical significance. Since a number of mutually dependent explanatory variables could influence the dependent variables, a stepwise regression procedure was used to identify the relative importance of these variables. Differences between sub-samples which differ according to one or another of the covariates are reported only when they were statistically significant, at least at the $p<0.05$ level.

3. FINDINGS AND DISCUSSION

Farmers' adoption rate of innovations

65% of farmers in the Nazareth region and 58% in the Gaza strip reported that they had adopted at least one major innovation affecting the structure or work on the farm, during the last five years. This can be considered to be quite a good rate of innovation. Table 1 summarizes the main innovations reported in the two regions. Figures relate to those farmers who did innovate.

(ABOUT HERE TABLE 1)

The percentage of innovators was similar in both regions, thus indicating that innovativeness was similar, but the different socio-economic situations in the two regions influenced farmers'decisions what kind of innovation to adopt. In the Nazareth region, mechanization was "in"; in Gaza it seems not to have attracted much interest. In the Nazareth region labour is more expensive than

in the Gaza strip, and farmers can obtain mechanical equipment under favourable credit conditions. Also, the average farm size is larger in the Nazareth area (4.8 ha) than in the Gaza strip (3.2 ha), thus making mechanization more attractive.

The use of Plastic covering (including plastic green houses) started earlier in the Nazareth region and reached Gaza only after 1967. Therefore it is still more of an innovation in Gaza, compared to Nazareth. Because labour is cheaper and more available in the Gaza strip, farmers grow now more labour intensive crops (e.g. strawberries) under plastic.

Drip irrigation is a common object for innovations, in both regions.

Farmers' sources of first information

Table 2 shows the sources from which farmers received their first information about an innovation which they later adopted. The percentages in this and in the following tables relate to the number of innovations, which was higher than the number of innovators, in the Nazareth region.

(ABOUT HERE TABLE 2)

Practically all farmers received their first information about an innovation which they later adopted, from an interpersonal source. Extension advisers and other farmers are about equal in their importance as first source of information. In the Gaza strip, still the more traditional of the two regions, the extended family is still one of the major sources of information. In the Nazareth area farmers seem to exchange information to a larger degree with other farmers, outside the family circle.

In the Gaza strip, 61% of agricultural committee members heard about the innovation from advisers. Among non-members of committees, only 18% did so. In the Nazareth region, the same trend existed: 63% of committee members received their first information about an innovation from an adviser, while only 26% of non-members did so. This is another indication that members of agricultural committees have a more effective contact with the extension service. As the more

sophisticated members of their reference group they use more "cosmopolite" interpersonal sources of information.

In contrast to many research reports from other developed countries (e.g.Blackburn et al, 1982 on Ontario, Canada; Forest & Marshall, 1977, on Wisconsin; ADAS, 1980, on the United Kingdom), neither the written nor the electronic mass media were mentioned at all as sources of first information on agricultural innovations. Both the Nazareth and Gaza regions have no well developed farming press. The weekly agricultural television program in Arabic was shown to be more popular than radio broadcasts, even among Jewish farmers (Blum & Azencot, 1987), but apparently, its reports about new features come after farmers have heard about them from interpersonal sources.

Sources of further advice.

After hearing about a new innovation which sounds interesting to farmers, they collect "worth-knowledge" and advice, before they decide, if they should adopt the idea. Usually in a second step, after having made the decision to adopt the innovation, farmers inquire how to implement the innovation.

Table 3 summarizes the sources to which farmers went for further information on these two questions. The sources add up to more than 100%, because some of the farmers went to more than one source to obtain further advice.

(ABOUT HERE TABLE 3)

The general order of the sources is the same as in the previous question, about the first information. Extension advisers were used as the main technical experts, but when farmers had to decide if it was worthwhile to invest in an innovation, experienced farmers and, to some extent the family (who often helped financially) were the more frequent sources of further information and discussion. All other possible sources were of little importance.

Bigger farmers tended to consult their families on technical know-how less than smaller farmers.

All together, farmers in the Nazareth region used more sources of information than their peers in the Gaza strip, especially on the basic question, if the innovation was worthwhile. In the Gaza strip only three out of four innovators sought more information before deciding if he should adopt the contemplated innovation. In the Nazareth region, innovations, esp. mechanization, demanded heavier investments. This might be the reason why these farmers discussed their plans with more sources of information. Apparently, they attributed to extension workers not only professional expertise (as in the Gaza strip), but more than twice as many farmers in the Nazareth region, compared to Gaza, discussed with extension advisers also the overall question, if the planned innovation should be adopted. Extension advisers in the Nazareth region have no statutory functions, and therefore their communication with farmers can be more informal. They are felt rather as local than as cosmopolite interpersonal knwowledge providers. In the Gaza strip, farmers prefer to discuss the "worth-knowledge" in the family circle.

It is interesting to note that Scoullar (1978) found also in Britain that the family was of pivotal importance in the innovation adoption process. Taking in account the socio-cultural differences between English and Arab societies, it is not surprising that in Scoullar's study the nuclear, rather than the extended family was the focus of deliberation.

In our study we were especially interested in the role of extension advisers as source of information, at different stages in the innovation adoption process. According to Rogers (1983), change agents (in this case advisers) "could perhaps play their most distinctive and important role in the innovation process if they concentrated on how-to knowledge" (instead of creating awareness). Table 4 summarizes the importance of the extension advisers as source of information, at different stages of the decision making process.

(ABOUT HERE TABLE 4)

In both regions, extension advise was mainly sought for technical issues (how to implement) and less for deciding, if the innovation was worthwhile to be adapted. These figures refer to the source of information; they do not indicate

the qualitative influence which the different sources had on the final decision.

When farmers receive their first information from extension, they tend to go there also for technical advice. This was the case with 85% of the farmers in the Nazareth region and with all farmers in the Gaza strip who had heard about an innovation from extension.

Who had the strongest influence?

Table 5 shows who, according to the respondents, had the strongest influence on the final decision to adopt the innovation. (N indicates the number of decisions).

(ABOUT HERE TABLE 5)

Here we can see a clear difference between the two regions in farmers' decision making behaviour. In the Nazareth region, advisers had a very strong influence and the family was less influential. In the Gaza strip, where advisers have statutory powers and more contact with farmers, one might expect that also their influence would be strong. Table 4 shows that this was the case, but the influence of the family was more dominant. The farming population in the Nazareth region is more cosmopolitic than in the Gaza strip, where the family influence is stronger, especially in financial matters.

Unlike the situation in other countries, e.g. in Australia (Blum et al., 1984), farmers in our population readily agree that they make decisions, after due consultation by, and under the influence of those on whom they can rely. Only very few argued that they were not influenced by anybody.

In the Gaza strip, 50% of committee members, but only 18% of non-committee members attributed the strongest influence on their decision making to extensionists ($p<0.05$), another sign of the closeness of agricultural committee members to extension advisers. In the Nazareth region the figures were 69% and 53% respectively. In this case the t-test showed that the difference was not statistically significant.

The strong influence of extension on farmers' decision making can be seen in Figure 1, which shows the pathways of decision making among 51 decisions taken in the Nazareth region, in which the main source of further information could be identified.

In more than three quarters of the cases, in which farmers had received information from extension at least at one point in the decision making process (lines 1-7), extension had the strongest influence on their decision. The 16 farmers who did not approach extension for advice in decision making represent 31% of the decision makers, a figure nearly identical with the 33% of farmers in the Nazareth region who did not have any contact with the extension service (Blum, 1987). Nearly all farmers who deliberated with advisers if they should adopt the innovation, mentioned the advisers as the most influential source, irrespective of their first source of information.

Looking back: Would they decide the same again?

We asked farmers, if they would again adopt the same innovation, given an opportunity to do so. 98% in the Nazareth region and 86% in the Gaza strip stated that they would make again the same decision. Farmers in both regions seem to be quite happy with the decisions they had taken, and discontinuance was low.

Decisions not to adopt an innovation.

45% and 95% in the Nazareth and Gaza regions, respectively, considered an innovation, but then decided not to adopt it. Of these who did so, 63% in the Nazareth region and 44% in the Gaza strip contemplated the building of green houses. In the latter region, an additional 28% considered the introduction of plastic cover and rejected the idea. The main reason (73% in Nazareth and 94% in Gaza) for the rejection of the innovation under review was economical. This reemphasizes the importance of "worth-knowledge" in the decision making process of farmers.

4. SUMMARY

The types of innovations which traditional farmers in the two regions adopted were influenced by the length of time during which each region was exposed to an intensive agricultural knowledge system and to changing socio-economic conditions. In the Nazareth region, where extension has a longer history, plastic greenhouses were no longer a novelty, and the price of labor made mechanization attractive. In the Gaza strip, where modernization through improved extension started some years later, plastic technology was still the main innovation, followed by drip irrigation which (also in the Nazareth region) was a focal point of the agricultural knowledge system.

As hypothesized, asking farmers to state their sources of "how-to" and "worth" knowledge yielded different answers. This empirically substantiates the argument, that at the persuasion stage in the adoption process a "worth" type of knowledge should be added to Roger's classical "how-to" knowledge.

Extension had a strong influence on farmers' decision making process. This was especially true for the (technical) "how-to" advice. The large majority of farmers who had contact with advisers (especially in the Nazareth region, where advisers have no statutory functions) stated also that these had the strongest influence on their adoption of innovation. Once farmers had received their first information from advisers (which was usually not the case), they were also influenced by them to adopt the innovation. When deciding if they should adopt an innovation, Nazareth farmers tended to go to their advisers for further discussion, rather than to other farmers. In the Gaza strip the most influential source of support in the decision, if to adopt an innovation was the family. Probably the reason was a higher economic and social dependence on the family, in the more traditional Gaza strip; but the sample was too small and the socio-economic background information was not sufficient to prove this point, although informal remarks by Gaza farmers strongly point into this direction.

Once farmers had made a decision, only very few regretted their choice. Nearly always when they rejected the suggestion to innovate, the reason was

economical. All together, farmers in both regions showed a rational decision making behavior, balancing between a wish to innovate and careful weighing of the economic worth of the innovation.

Notes

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Table 1

Percentage of farmers reporting different innovations

Innovation	Nazareth	Gaza
Mechanization	35	--
Drip irrigation	24	30
New crops (plantations)	18	7
Plastic covering	12	47
Others	9	16

Table 2

Sources of first information about innovations (%)

Source of information	Nazareth	Gaza
Extension advisers	35	35
Other farmers	40	29
Family	15	35
Commercial firms	4	--
Other sources	5	2

Table 3

Sources for more information if and how the innovation should be adopted (%)

Source of information	Nazareth		G a z a	
	if	how	if	how
Extension advisers	29	64	11	67
Other farmers	58	41	38	38
Family	45	37	26	26
Commercial firms	5	7	--	8
Total	137	149	75	139

Table 4

Percentage of cases in which farmers received information from extension at different stages in the decision making process

Stage	Nazareth	Gaza
First information	35	35
Deciding if to adapt	29	11
Deciding how to adapt	64	67

Table 5

Sources of strongest influences on decision making (%)

Source of influence	Nazareth	Gaza
Extension advisers	55	37
Other farmers	30	14
Family	9	46
Commercial firms	2	--
No one	2	2
Others	2	1

Fig. 1

Decision making pathways of farmers

(N = numbers of decisions)